

REMARKS

Claims 1-11 are pending in the present application. Claims 12-20 have been canceled. Claims 1 and 6-10 have been amended.

Applicants respectfully request reconsideration of the application in view of the foregoing amendments and the remarks appearing below, which Applicants believe place the application in condition for allowance.

Objections to Claims

The Examiner has objected to claims 1 and 9 as containing informalities. More particularly, the Examiner states that in claim 1, last line, the phrase "said base" should be changed to --said emitter-- and that in claim 9, last line, the phrase "said doped epitaxial layer" should be changed to --said doped epitaxial extrinsic base layer--.

Applicants agree and have amended claims 1 and 9 accordingly. Therefore, Applicants respectfully request that the Examiner withdraw the present objections.

Rejection Under 35 U.S.C. § 102

The Examiner has rejected claims 1-11 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 6,362,066 to Ryum et al., stating that Ryum et al. disclose all of the limitations of these claims. Applicants respectfully disagree.

Regarding independent claims 1 and 7, each of these claims as amended includes, among others, a limitation that the doped epitaxial extrinsic base layer include a remnant oxidated ring immediately surrounding the emitter aperture. This limitation was formerly in each of dependent claims 6 and 8.

In the present Office Action, the Examiner asserted that Ryum et al. disclose such a remnant oxidated ring, stating that the Ryum et al. device includes "a remnant oxide ring 191 immediately surrounding the lower portion of the emitter 133." Office Action, page 3, paragraph 6. While it may be reasonable to describe the remnant of oxide masking film 191 of the Ryum et al. device as a "remnant oxide ring," the Ryum et al. remnant ring is not formed in the doped epitaxial extrinsic base layer as required by each of original claims 6 and 8, and now each of amended claims 1 and 7. Rather, the masking film 191 is formed independently of the selectively deposited doped second base semiconductor electrode 123b that surrounds masking film remnant 191 in the completed device. Since the remnant of masking film 191 cannot

reasonably be considered to be part of the doped layer of second semiconductor electrode 123b, the Ryum et al. device cannot anticipate either of amended independent claims 1 and 7, nor claims 2-6, 8 and 9 that depend therefrom.

Regarding amended claim 10, which is now an independent claim, this claim includes the limitation, among others, of an emitter trench etch landing pad remnant located on the doped epitaxial extrinsic base layer immediately surrounding the emitter aperture. In rejecting claim 10 that included a landing pad remnant limitation, the Examiner asserted that silicide layer 129 of the Ryum et al. device is a landing pad remnant. While Applicants respectfully disagree that it is not reasonable to consider silicide layer 129 as a landing pad remnant, Applicants have further defined the remnant as being an emitter trench etch landing pad remnant to convey that the remnant is what remains of an etch-stop landing pad used to form a portion of the emitter trench of the claimed bipolar device. The Ryum et al. silicide layer 129 is clearly not used as an etch stop in forming the emitter trench of the Ryum et al. device. Consequently, the Ryum et al. device cannot anticipate the bipolar device of amended claim 10, nor claim 11 that depends therefrom.

Regarding claims 6 and 8, Applicants have amended each of these claims to include the limitation that the remnant oxide ring be perfectly symmetrical about the aperture in the doped epitaxial extrinsic base layer. Although Ryum et al. show the remnant oxide ring of mask 191 as being symmetrical in the manner of amended claims 6 and 8, in reality the Ryum et al. oxide ring will not be perfectly symmetrical. This is so because of the process that Ryum et al. use to form the aperture in mask 191. At col. 10, lines 29-32, Ryum et al. describe that the emitter insulation layer 137 and masking film 191 are opened using a photomask and etching. Photolithography techniques are limited in their alignment precision between different levels, which, for example, is of the order of magnitude of 100nm even for the state-of-art deep UV (DUV) photolithography used in advanced BiCMOS technologies, and it is, for all practical purposes, impossible to perfectly align the aperture in the etch mask with the mask film 191 so that when the mask film is opened by etching, the remnant of the mask film will be perfectly symmetrical about the opening.

In contrast, in one embodiment of the present invention the remnant oxidated ring is formed by oxidizing a portion of the doped extrinsic base layer (layer 164, FIG. 8 of the present application) through an opening in the landing pad (element 168, FIGS. 7 and 8). As is well

known in the art, this sort of oxidation spreads laterally in layer 164 in a uniform manner so that when the central region of the oxidated region (element 208, FIG. 8) is etched away as illustrated in FIG. 9, the remnant oxidated ring of the oxidated region 208 is perfectly symmetrical. Since, in reality, the Ryum et al. device does not include a perfectly symmetrical remnant oxidated ring, it cannot anticipate amended claims 6 and 8.

For at least the foregoing reasons, Applicants respectfully request that the Examiner withdraw the present anticipation rejection.

CONCLUSION

In view of the foregoing, Applicants submit that claims 1-11, as amended, are in condition for allowance. Therefore, prompt issuance of a Notice of Allowance is respectfully solicited. If any issues remain, the Examiner is encouraged to call the undersigned attorney at the number listed below.

Respectfully submitted,

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